

## MISCELLANEOUS NOTES ON SPHAGNUM—11

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### NEW SPECIES

**Sphagnum** [sect. *Sphagnum*] **lapazense** H. Crum, sp. nov.—TYPE: BOLIVIA. La Paz: Nor Yungas, trail by construction camp, N on Bolivia 1 from La Paz to Nor Yungas, 16°16'89"S, 67°50'89"W, under large rock overhang with running water, 3100–3300 m, 12 Nov 1999, *M. J. Price, S. P. Churchill & Z. Magombo 1236* (holotype: MICH!; isotype: MO!). Fig. 1.

Plantae laete virides, laxe caespitosae, 1.5–4 cm altae. Caules fusci; cellulae epidermidis sine poris, efibrillosae; cylindrus lignosus obscure fuscus. Folia caulina et ramulina persimiles. Rami solitarii vel 2-fasciculati (1 pependens, debilis). Folia 1.3–1.5 mm longa, ovata, concava, apice cucullata, marginibus sulco resoptorio instructa; cellulae hyalinae fibrillosae, non septatae, superficie exteriori pseudoporis paucis, interiore poris 4–9 rotundis annulatis ad commissuras obsitae; cellulae chlorophylliferae sectione transversali ellipticae, interiore foliorum liberae.

Plants blue-green when dry, bright green when moist, in loose tufts 1.5–3 (–4) cm high. Stems dark brown, nearly black; cortex 1-layered, without pores or fibrils; wood cylinder dark brown. Branches single or more often double (1 weak and pendent). Stem and branch leaves similar, 1.3–1.5 mm long, ovate, concave, ± hooded at apex, with a marginal resorption furrow but no membrane gaps at back of the apex; hyaline cells fibrillose throughout, non-septate, on the outer surface with few pseudopores at or near corners, rarely in groups of 2–3 at adjoining ends, on the inner surface with 4–9 round, ringed pores near the commissures; green cells in section elliptic, narrowly exposed on both surfaces, the hyaline cells convex on both surfaces.

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** La Paz: Nor Yungas, trail by construction camp, N on Bolivia 1 from La Paz to Nor Yungas, 16°16'89"S, 67°50'89"W, under large rock overhang with running water, 3100–3300 m, 12 Nov 1999, *M. J. Price, S. P. Churchill & Z. Magombo 1235* (MICH, MO).

The plants are small and isophyllous, and the leaves have only a few pseudopores on the outer surface but numerous round, ringed pores on the inner. The branches may be single or double, the pendent branch very weak. The unistratose cortical cells of stems and branches lack fibrils and pores. The green cells are narrowly exposed on both surfaces. Because of somewhat cucullate leaves with resorption furrows at the margins, the species clearly belongs in the section *Sphagnum*, although the leaves lack membrane gaps at the back of the apex and fibrils in the stem and branch cortex.

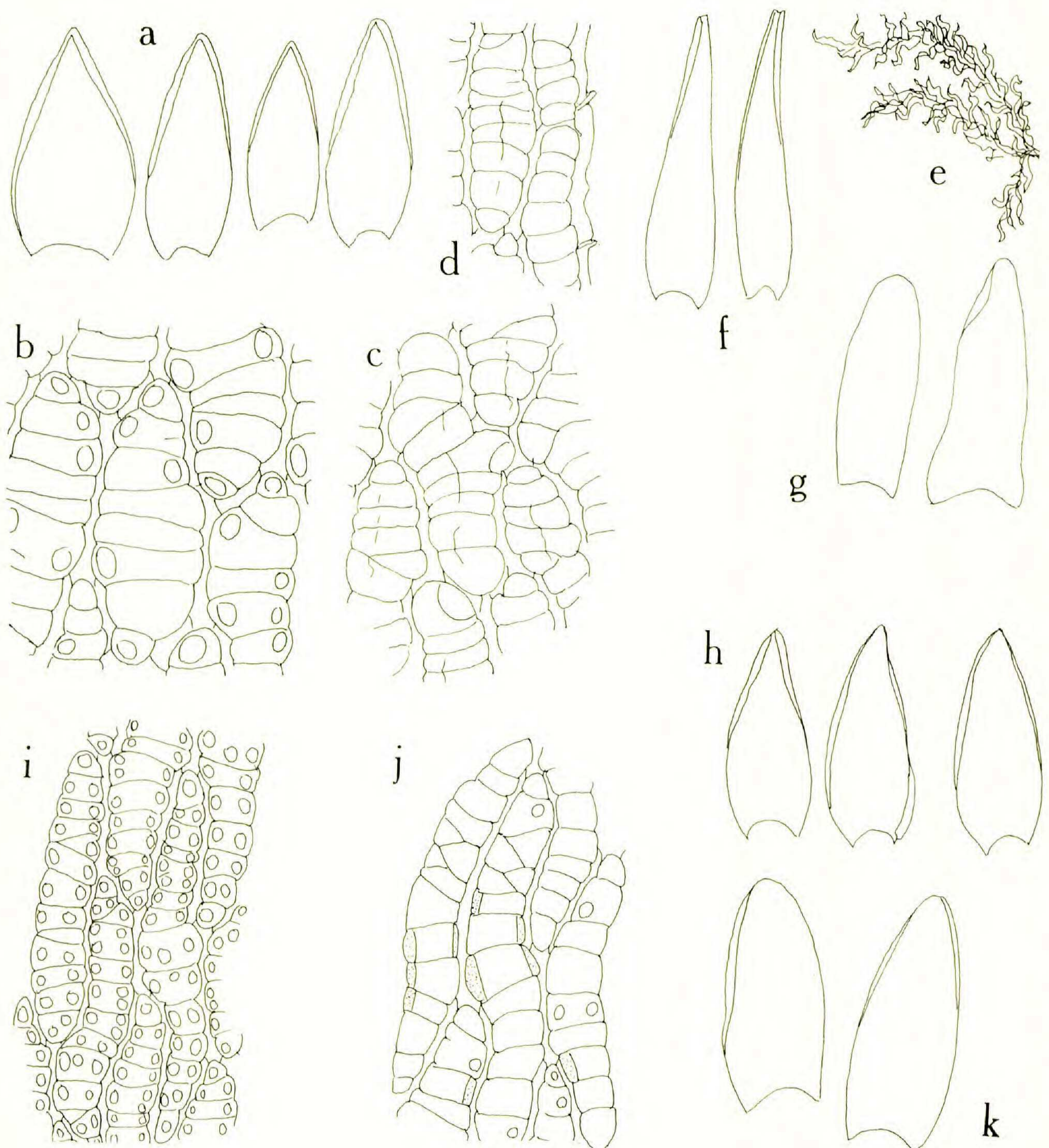


FIG. 1. a-d. *Sphagnum lapazense*. a. Branch leaves,  $\times 20$ . b. Upper cells of branch leaf, outer surface,  $\times 390$ . c. Upper cells of branch leaf, inner surface,  $\times 390$ . d. Upper marginal cells of branch leaf showing marginal resorption furrow,  $\times 390$ . e-g. *Sphagnum crispatum*. e. Branch fascicle, dry,  $\times 5$ . f. Branch leaves,  $\times 20$ . g. Stem leaves,  $\times 20$ . h-k. *Sphagnum luetzelburgii*. h. Branch leaves,  $\times 2$ . i. Upper cells of branch leaf, outer surface,  $\times 390$ . j. Upper cells of branch leaf, inner surface,  $\times 390$ . k. Stem leaves,  $\times 20$ .

***Sphagnum*** [sect. *Cuspidata*] ***crispatum*** H. Crum, sp. nov.—TYPE: PERU. Cajamarca: Hualgayoc, Las Lagunas to the west of Cajamarca,  $07^{\circ}10'S$ ,  $78^{\circ}15'W$ , 3900 m, 25 May 1973, P. Hegewald & E. Hegewald 6213 (holotype: MICH!; isotype: MO!).

Fig. 1.

Plantae parvae, luteae, laxe caespitosae. Caules pallido-luteoli. Folia caulina 1.4–1.6 mm longa, triangulo-lingulata, concavo-acuta; cellulae hyalinae superne fibrillosae, 0–3-septatae, poris nullis vel superficie dorso poris paucis. Rami 2–3-fasciculati (2 patentes). Folia ramulina sicca subtubulosa et valde crispata, 1.5–2 mm

longae, oblongo-ovata, concava, marginibus integris; cellulae hyalinae superne non septatae, superne fibrillosae, poris ut in foliis caulinis, superficie interiore poris nullis; cellulae chlorophylliferae sectione transversali triangulo-trapezoideae, superficie exteriori latiore expositae.

Plants small and slender, 2–5 cm long, in lax, yellow patches. Stems yellowish; cortex 2-layered, without pores at the surface; wood cylinder pale yellow. Stem leaves 1.4–1.6 mm long, triangular-lingulate, concave-acute, narrowly bordered; hyaline cells fibrillose in the upper half, undivided or some leaves on the same stem with some cells 1–3-septate, on the outer surface with pores none or very few, small, round, at or near side corners, on the inner surface with pores none. Branches in fascicles of 2–3 (2 spreading, 1 short, weak, and pendent or lacking). Branch leaves when dry subtubulose, spreading and strongly crisped, when moist erect with curved-spreading,  $\pm$  homomalous tips, 1.5–2 mm long, oblong-ovate and concave-tapered to a narrowly truncate, dentate apex, bordered by thick-walled, linear cells in 3–5 rows; hyaline cells fibrillose in the upper 1/2 or less, undivided, otherwise similar to those of stem leaves; green cells in section triangular to trapezoidal, with exclusive or broader exposure on the outer surface, the hyaline cells bulging on both surfaces, somewhat more so on the inner.

The plants are small as compared with those *S. cuspidatum* Ehrh. ex Hoffm., and they have some resemblance to that species, although the branch tips are not particularly tapered and the habitat, aquatic or not, is unknown. The most striking difference is seen in the spreading, strongly crisped branch leaves, when dry. Both stem and branch leaves are fibrillose above and have few or no pores. The hyaline cells of most leaves are undivided but, even on the same stems, some leaves have a few cells that are obliquely divided one to three times.

**Sphagnum** [sect. *Subsecunda*] **luetzelburgii** H. Paul ex H. Crum, sp. nov.—TYPE: BRAZIL. Rio de Janeiro: Serra dos Orgãos, Schlucht auf der Südseite des Morro Assu, Aug 1915, *Ph. von Luetzelburg 7012* (holotype: MICH!; isotype: M!). Fig. 1.

Plantae obscure fuscae, 3–4 cm altae. Caulis unistratus, sine poris; cylindrus lignosus obscure fuscae. Folia caulina fusca, 1.5 mm longa, concava, elliptica, apice rotunda; cellulae hyalinae aliquando 1-septatae, omnino fibrosae, superficie exteriori poris commissuralibus numerosis, grandiusculis, rotundis, annulatis, etiam poris submedianis, latitudine cellularum subaequantis, interiore poris paucis vel nullis. Rami 2-fasciculati. Folia ramulina 1.4–1.6 mm longa, concava, late ovata; cellulae hyalinae superficie exteriori poris parviusculis, rotundo-ellipticis, annulatis seriebus commissuralibus dispositionibus, etiam poris minutis medianis paucis, interiore poris nullis vel paucis et pseudoporis seriebus brevibus ad commissuras sitis; cellulae chlorophylliferae sectione transversale orbiformes, utroque latere folii aequaliter liberae.

Plants dark brown, 3–4 cm high. Stems dark brown; cortical cells in 1 layer, without pores; wood cylinder dark brown. Stem leaves 1.5 mm long, elliptic, concave, broadly rounded at the apex, narrowly bordered; hyaline cells occasionally 1-septate, fibrillose throughout, on the outer surface with numerous rather large, round, ringed pores in interrupted commissural rows and also median pores as wide as cells, often several in a row, on the inner surface with pores none or few. Branches in fascicles of 2, 1 short, stout, and spreading (6 mm long), the other

weaker and  $\pm$  spreading. Branch leaves 1.4–1.6 mm long, deeply concave, broadly ovate, broadly pointed, narrowly bordered; hyaline cells on the outer surface with rather small, ringed, rounded-elliptic pores in continuous commissural rows and often some few small, median pores, on the inner surface with pores none or with a few small, round pores at ends and corners and sometimes short rows of pseudopores partitioned off along commissures; green cells barrel-shaped to subrectangular, equally exposed on both surfaces, the hyaline cells moderately convex on both surfaces.

The plants are dark brown and short but stout, with short, stout spreading branches. The stem leaves have broad pores on the outer surface, both commissural and median, and the median pores are nearly as wide as the cells and often arranged in a short row. The branch leaves have on the outer surface smaller pores in continuous commissural rows and some few median pores, and on the inner surface they have pores none or few and sometimes short rows of pseudopores partitioned off at the commissures.

**Sphagnum** [sect. *Subsecunda*] **noryungasense** H. Crum, sp. nov.—TYPE: BOLIVIA. La Paz: Nor Yungas, trail by construction camp N on Bolivia 1 from La Paz to Nor Yungas, 16°16'89"S, 67°50'89"W, secondary humid montane forest, under large rock overhang with running water, 3100–3300 m, 12 Nov 1999, *M. J. Price, S. P. Churchill & Z. Magomba 12347* (holotype: MICH!; isotype: MO!). Fig. 2.

Plantae usque ad 6 cm. altitudine. Caules pallide virides; hyalodermis unistratosa, sine poris; cylindrus lignosus debilis, pallide viridis. Folia caulina 1.2–1.3 mm longa, ovata, concava; cellulae hyalinae fibrillosae usque ad basin, saepe septatae, utroque superficie poris commissuralibus multis. Rami 2-fasciculati (1 pendens). Folia ramulina 1.3–1.8 mm longa, late ovata; cellulae hyalinae superficie exteriori poris et pseudoporis numerosis, interiori poris numerosis, pseudoporis paucis; cellulae chlorophylliferae utroque latere folii anguste expositae.

Plants small (up to about 6 cm high), pale green. Stems pale green; hyaloderm 1-layered, without pores; wood cylinder pale green, scarcely differentiated. Stem leaves much like branch leaves, 1.2–1.3 mm long, ovate, concave, narrowly bordered; hyaline cells fibrillose throughout, often 1-divided, especially toward the base, on the outer surface with numerous elliptic pores and pseudopores at commissures, more numerous pores but few pseudopores on the inner surface. Branches 2-fasciculate (1 weaker and pendent). Branch leaves 1.3–1.8 mm long, broadly ovate; hyaline cells on the outer surface with numerous elliptic pores at the commissures, on the inner surface with numerous pores but few pseudopores scattered at the commissures; green cells narrowly exposed on both surfaces.

The stem and branch leaves are much alike, except that the stem leaves are smaller, with hyaline cells often septate. The hyaloderm is one-layered, and the wood cylinder is scarcely differentiated. The stem leaves have many pores and some pseudopores on both surfaces. The branch leaves have rather few pores and pseudopores on both surfaces, fewer on the inner.

**Sphagnum** [sect. *Subsecunda*] **hegewaldii** H. Crum, sp. nov.—TYPE: PERU. Amazonas: Chachapoyas District, Las Palmas, zw. Balsas u. Leimemba, 06°46'S, 77°49'W, on soil, 3000 m, 31 Aug 1973, *P. Hegewald & E. Hegewald 7007* (holotype: MICH!; isotype: MO!). Fig. 3.

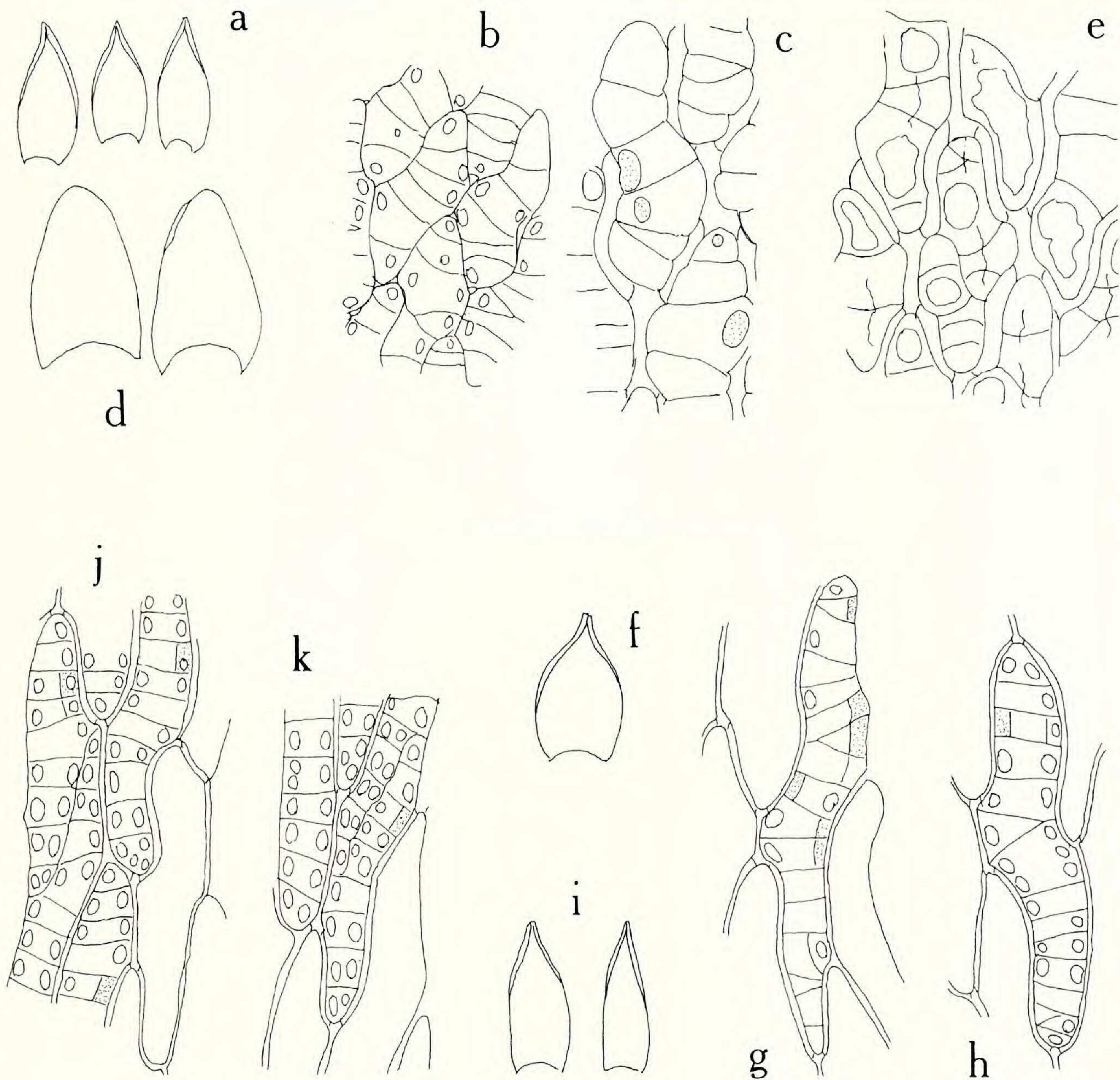


Fig. 2. a–e. *Sphagnum priceae*. a. Branch leaves,  $\times 20$ . b. Upper cells of branch leaf, outer surface,  $\times 390$ . c. Upper cells of branch leaf, inner surface,  $\times 390$ . d. Stem leaves,  $\times 20$ . e. Upper cells of stem leaf, outer surface,  $\times 390$ . f–k. *Sphagnum noryungasense*. f. Branch leaf,  $\times 20$ . g. Upper cells of branch leaf, outer surface,  $\times 390$ . h. Upper cells of branch leaf, inner surface,  $\times 390$ . i. Stem leaf,  $\times 20$ . j. Upper cells of stem leaf, outer surface,  $\times 390$ . k. Upper cells of stem leaf, inner surface,  $\times 390$ .

Plantae parvae, obscure rufobrunneae. Hyalodermis caulina unistratosa, sine poris; cylindrus lignosus obscuro-fusca. Folia caulina 1.1–1.3 mm longa, ut ramulina persimiles. Rami 2-fasciculati, uterque patentes. Folia ramulina 1–1.1 mm longa, ovata, concava; cellulae hyalinae superficie exteriori poris ellipticis seriebus commissuralibus, paucifibrillosis, interiore pseudoporis paucis sed fibrillosis multis; cellulae chlorophylliferae sectione transversali utroque latere foliorum anguste liberae sed pariete interiore plus minus longiore.

Plants small (up to 2.5 cm high), dark red-brown above, light brown below. Stem hyaloderm 1-layered, without pores; wood cylinder dark brown. Stem leaves similar to branch leaves but somewhat longer (1.1–1.3 mm long). Branches 2-fasciculate, both spreading, short and equal in length (4–6 mm long), tumid. Branch leaves 1–1.1 mm long, ovate, concave; hyaline cells on the outer surface with elliptic pores in continuous commissural rows but with fibrils none or scarcely present, on the inner surface with commissural pseudopores few or none but

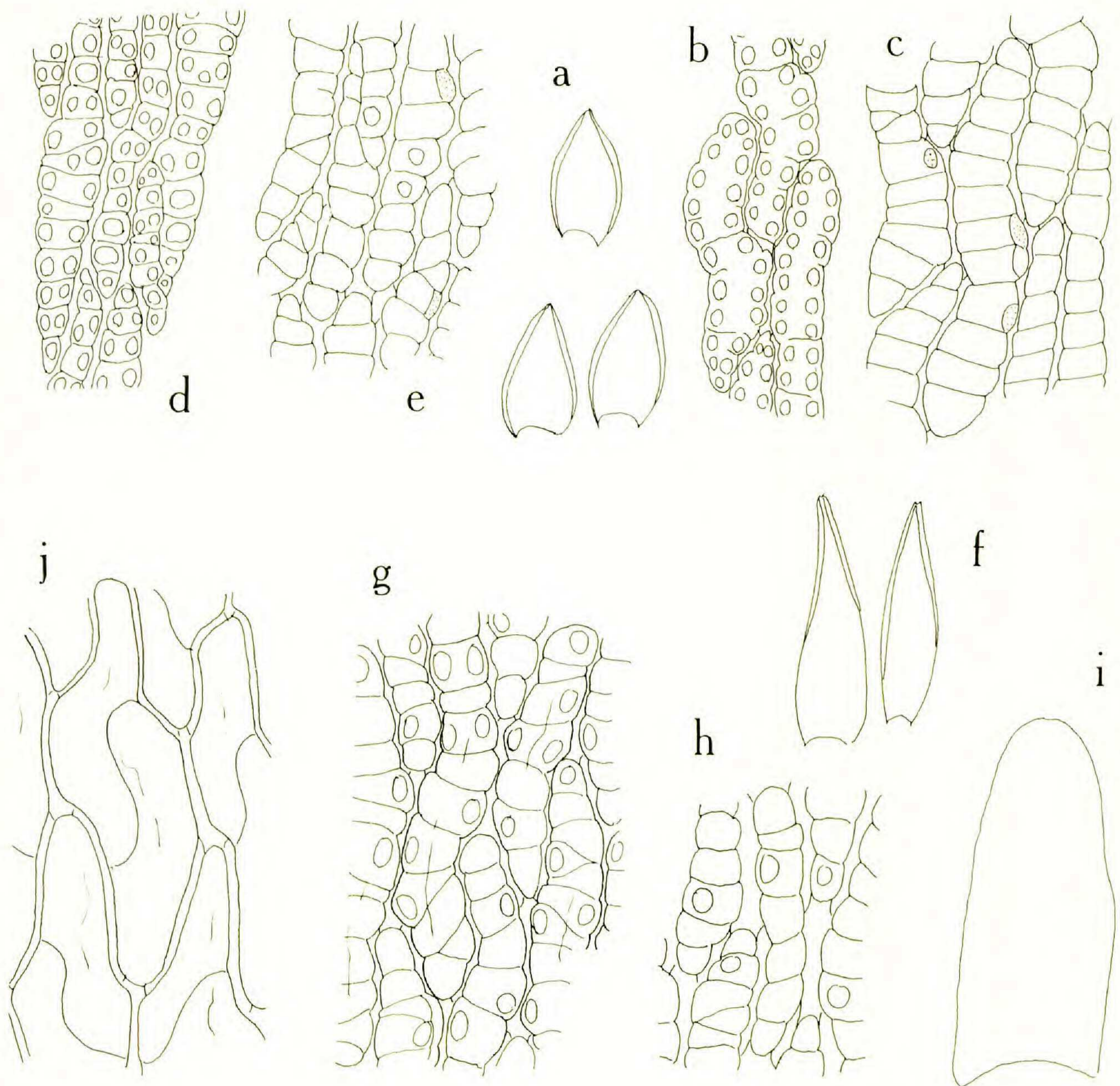


Fig. 3. a–e. *Sphagnum hegewaldii*. a. Branch leaves,  $\times 20$ . b. Upper cells of branch leaf, outer surface,  $\times 390$ . c. Upper cells of branch leaf, inner surface,  $\times 390$ . d. Upper cells of stem leaf, outer surface,  $\times 390$ . e. Upper cells of stem leaf, inner surface,  $\times 390$ . f–i. *Sphagnum breedlovei*. f. Branch leaves,  $\times 20$ . g. Upper cells of branch leaf, outer surface,  $\times 390$ . h. Upper cells of branch leaf, inner surface,  $\times 390$ . i. Stem leaf,  $\times 20$ . j. Upper cells of stem leaf,  $\times 390$ .

fibrils well developed throughout; green cells narrowly exposed on both surfaces, somewhat more so on the inner.

The plants are small, dark-brown, and shiny, at least when dry. The branches are spreading and only 4–6 mm long. The stem and branch leaves are similar. On the outer surface the hyaline cells have continuous rows of commissural pores, but the fibrils are none or scarcely suggested; on the inner surface there are few or no pseudopores, but the fibrils are well developed.

***Sphagnum*** [sect. *Subsecunda*] ***lojense*** H. Crum, sp. nov.—TYPE: ECUADOR. Loja: Spring bog, on Ona-Saraguro road ca. 3 km S of Carboncillo,  $03^{\circ}\text{S}$ ,  $79^{\circ}11'\text{W}$ , 3000 m, 11 Apr 1998, S. Laegaard 18703B (holotype: MO!).

Plantae graciles. Hyalodermis caulis strato uno, sine poris; cylindrus lignosus pallide luteus. Folia caulina 2–2.2 mm longa, oblong-elliptica, apice obtusa vel

rotundata; cellulae hyalinae usque ad basin fibrillosae, 1–3-septatae, utroque latere poris et pseudoporis paucis. Ramorum fasciculi ramis 5 (3 patentis). Folia ramulina 2.2–2.8 mm longa, rotundato-ovata, breviter concavo-acuta; cellulae hyalinae utroque latere pseudoporis ± numerosis, commissuralibus; cellulae chlorophylliferae sectione transversali orciformes, cellulis hyalinis utroque latere convexis.

Plants ca. 6 cm high, in rather compact, bronze to brown masses. Stem hyalodermis 1-layered, without pores; wood cylinder pale yellow. Stem leaves 2–2.2 mm long, oblong-elliptic, rounded at the apex; hyaline cells fibrillose throughout, mostly 1–3-septate, on the outer and inner surfaces with few scattered, commissural pores and pseudopores. Branches crowded, short, stout, often curled at the tips, in fascicles of 5 (3 spreading). Branch leaves not secund, 2.2–2.8 mm long, rounded-ovate, shortly concave-acute; hyaline cells on the outer surface with several to numerous pseudopores at commissures, on the inner surface somewhat fewer; green cells orciform, equally exposed on both surfaces, the hyaline cells distinctly convex on both surfaces.

ADDITIONAL SPECIMEN EXAMINED. **Ecuador.** Loja: Spring bog, on Ona-Saraguro road ca. 3 km S of Carboncillo, 03°S, 79°11'W, 3000 m, 11 Apr 1998, S. Laegaard 18703E (MO).

The plants somewhat resemble species of the section *Sphagnum* because of rather stout branches with rounded-concave leaves. The hyaline cells of stem leaves are mostly 1–3-septate and have only a scattering of commissural pores on both surfaces. The branches are crowded and 5-fasciculate. The hyaline cells of branch leaves have rather numerous commissural pseudopores on both surfaces, and the hyaline cells are distinctly convex above and below.

**Sphagnum** [sect. *Acutifolia*] **breedlovei** H. Crum, sp. nov.—TYPE: MEXICO. Chiapas: Mpio. Motozintla de Mendoza, near summit of Cerro Mozotal, on rock, 2750 m, 24 Nov 1981, D. E. Breedlove & B. Bartholomew 55854 (holotype: MICH!; isotype: MO!). Fig. 3.

Plantae graciles, plus minusve 7 cm altae, pallide luteolae. Caules luteoli; cellulae hyalodermidis stratis 3–4, sine poris; cylindrus lignosus luteolus. Folia caulina 2 mm long, longo-lingulata, apice rotunda, anguste limbata; cellulae hyalinae efibrillosae, plerumque 1(–2)-septatae, superficie exteriori membranaceis ± plicatis. Rami 3-fasciculati. Folia ramulina 1.6–2 mm longa, lanceolata; cellulae hyalinae superficie exteriori membranaceis ± plicatis, poris commissuralibus pluribus (usque ad 9), interiore poris 0–3 medianis, rotundis, ± grandiusculis; cellulae chlorophylliferae sectione transversali triangulo-trapezoideae, dorso foliorum inclusae vel utroque liberae.

Plants slender, 7 or more cm high, in yellow, probably dense tufts. Stems yellow; epidermal cells in 3–4 layers, without pores; wood cylinder yellowish. Stem leaves 2 mm long, long-lingulate, rounded at the apex; hyaline cells mostly 1(2)-septate, efibrillose, on the outer surface with some development of membrane pleats. Branches 3-fasciculate (1 pendent). Branch leaves 1.6–2 mm long, lanceolate, bordered by linear cells in 3–4 rows; on the outer surface with 6–9 ringed, elliptic commissural pores of moderate size and some membrane pleats, on the inner surface with 0–3, rounded and rather large, median pores; chlorophyll cells in section triangular-trapezoid, more broadly exposed on the inner surface.

The narrowly lingulate stem leaves, the stem hyalodermis lacking pores, and pores on both surfaces of branch leaves justify recognizing this as a new species. The areolation of stem leaves suggests a relationship to *S. sparsum*, but the absence of pores in the stem cortex and the larger pores on the outer surface of branch leaves are significantly different.

**Sphagnum** [sect. *Acutifolia*] **priceae** H. Crum, sp. nov.—TYPE: BOLIVIA. La Paz: Nor Yungas, trail by construction camp, N on Bolivia 1 from La Paz to Nor Yungas, 16°16'89"S, 67°50'89"W, secondary, humid montane forest, in clump at edge of trail, 3100–3300 m, 12 Nov 1999, *M. J. Price, S. P. Churchill & Z. Magombo 1268* (holotype: MICH!; isotype: MO!).

Plantae parvae, molles, pallido-incarnatae. Caulis incarnatus; cellulae epidermidis poris nullis; cylindrus lignosus incarnatus. Folia caulina 1 mm longa, fere plana, lingulata vel triangulo-lingulata, anguste limbata, deorsum non dilatata; cellulae hyalinae praecipue efibrillosa (sed apice foliorum fibrillis paucis), saepe 1-septatae, superficie exteriore ad apicem poris rotundis paucis, interiore poris nullis. Rami 4-fasciculati (2 patentes). Folia ramulina 0.7–0.9 mm longa, oblongo-ovata; cellulae hyalinae poris parvis, rotundo-ellipticis, annulatis ad commissuras obsitis, ad apicem aliquando poris submedianis minutis quoque, interiore poris nullis se aliquando pseudoporis commissuralibus; cellulae chlorophylliferae sectione transversale triangulae, interiore foliorum liberae.

Small plants in soft, pinkish tufts. Stems pink; cortex without pores at surface; wood cylinder pink. Stem leaves 1 mm long, nearly plane, lingulate or triangular-lingulate, with border not noticeably broader at base; hyaline cells short at the apex, longer below, often 1-divided, on the outer surface with a few rudimentary fibrils and a few round pores or large gaps near the apex, with membrane pleats, on the inner surface with pores none. Branches 4-fasciculate (2 spreading), the capitulum very small. Branch leaves not 5-ranked, loosely spreading when moist, 0.7–0.9 mm long, oblong-ovate, concave; hyaline cells on the outer surface with small, rounded-elliptic, ringed pores near commissures and corners, at extreme apex also occasionally with 1–2 minute submedian pores, on the inner surface with no pores but occasional pseudopores at commissures; green cells in section triangular, exposed exclusively on the inner surface.

The plants are attractive, small in size and pink in coloration, with leaves spreading when dry. Because the hyaline cells of branch leaves have small pores, the species seems rather like *S. sparsum*, but the stem cortex lacks pores. The stem leaves, smaller than those of *S. sparsum*, are essentially without fibrils, pores, and gaps.

#### NEW NAMES

**Sphagnum** [sect. *Acutifolia*] **diblastoides** H. Crum, nom. nov.

*Sphagnum austro-americanum* H. Crum, *Bryologist* 98: 588. 1995, non *Sphagnum austro-americanum* H. Crum, 1993.

**Sphagnum** [sect. *Acutifolia*] **paulianum**, H. Crum, nom. nov.

*Sphagnum americanum* Warnst., *Sphagn. Univ.* 132. 1911, nom. nud. prov. *Sphagnum americanum* Paul in Herz., *Biblioth. Bot.* 88: 3. 1920, non *Sphagnum americanum* Warnst., 1911. *Sphagnum molle* var. *cochabambae* Maass, *Nova Hedwigia* 12: 85. 1966, nom. nud.